

Lower Colorado River Riparian Birds Three-year Summary 2008-2010

Lower Colorado River Multi-Species Conservation Plan

System Monitoring for Riparian Obligate Avian Species (Work Task D6) and Avian Use of Restoration Sites (Work Task F2)



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Today's Talk

- **Background Information**
- **System-wide area searches**
- **Habitat creation area searches**
- **Habitat modeling- covered species**



Purpose:

1. Implement long-term system-wide monitoring of riparian birds on the Lower Colorado River
2. Study the effects of habitat restoration measures on the Lower Colorado River

Goals 2008-2010:

1. Determine presence and estimate breeding population sizes of covered species
2. Estimate presence and abundances of other riparian landbirds
3. Determine habitat associations for the covered species based on field habitat assessments
4. Derive recommendations for restoration and continued bird monitoring under the adaptive management process outlined in the LCR MSCP



LCR-MSCP Covered Species

- **Gila Woodpecker**
(*Melanerpes uropygialis*)



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- **Gilded Flicker**
(*Colaptes chrysoides*)



Cindy Marple

LCR-MSCP Covered Species

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- **Vermilion Flycatcher**
(*Pyrocephalus rubinus*)



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- **Arizona Bell's Vireo**
(*Vireo bellii arizonae*)



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- **Summer Tanager**
(*Piranga rubra*)



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(*Colaptes chrysoides*)
- **Vermilion Flycatcher**
(*Pyrocephalus rubinus*)
- **Arizona Bell's Vireo**
(*Vireo bellii arizonae*)
- **Summer Tanager**
(*Piranga rubra*)
- **Sonoran Yellow Warbler**
(*Dendroica petechia sonorana*)



Survey Methods: Area Searches

Area Search Methods:

- Identify and count all birds of all species
- Age, sex, and breeding status
- Spot map all birds and get multiple locations for covered species



Two types of area searches:

Similar methods but different effort



Rapid Method Area Searches

- 80 system-wide plots
- Pre-development habitat creation sites
- Each plot surveyed twice (once a month)

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Similar methods but different effort



Rapid Area Searches

- 80 system-wide plots
- Pre-development habitat creation sites
- Each plot surveyed twice (once a month)

Intensive Area Searches

- Subset of 8 system-wide plots
- All habitat creation sites with 2 years of growth
- Each plot surveyed 8 times (once a week for 8 weeks)

Survey Basics

- Survey season: mid-April through mid-June
- All surveys began at sunrise and last several hours (must finish by noon)
- Surveyor must pass within 50m of all points on the plot
- Hiking, kayaks, and power boats were used to access plots
- Stratified random selection of plots, plot size varies



Evolution of Survey Methods

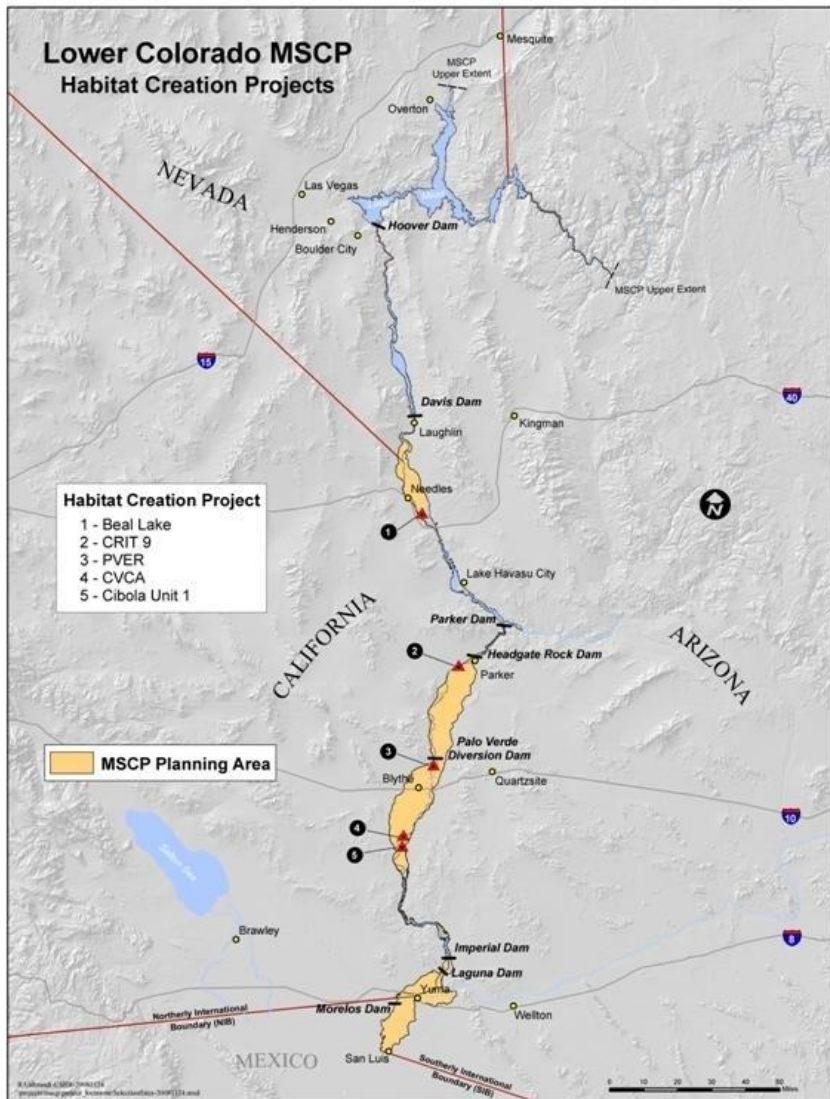
Categories	Behavior
Observed	Seen or heard only
Possible	Singing Pair seen or heard together
Probable	Territorial display Pair in suitable nesting habitat Courtship and or mate guarding Agitated behavior
Confirmed	Nest building Carrying nest material Prolonged distraction behavior Occupied nest Food carrying Dependent young present Fecal sac carrying Nest with eggs Nest with young

Take advantage of what we learned each year to make the data better:

- Protocols: intensive and rapid
- Data collection, entry, and summary
- Training surveyors
- What we are counting: individuals to breeding pairs



Study Area: Habitat Creation



Beal Lake Riparian Habitat Creation Project
Palo Verde Ecological Preserve
Colorado River Indian Tribe
Cibola Valley Conservation and Wildlife Area
Cibola Nature Trail

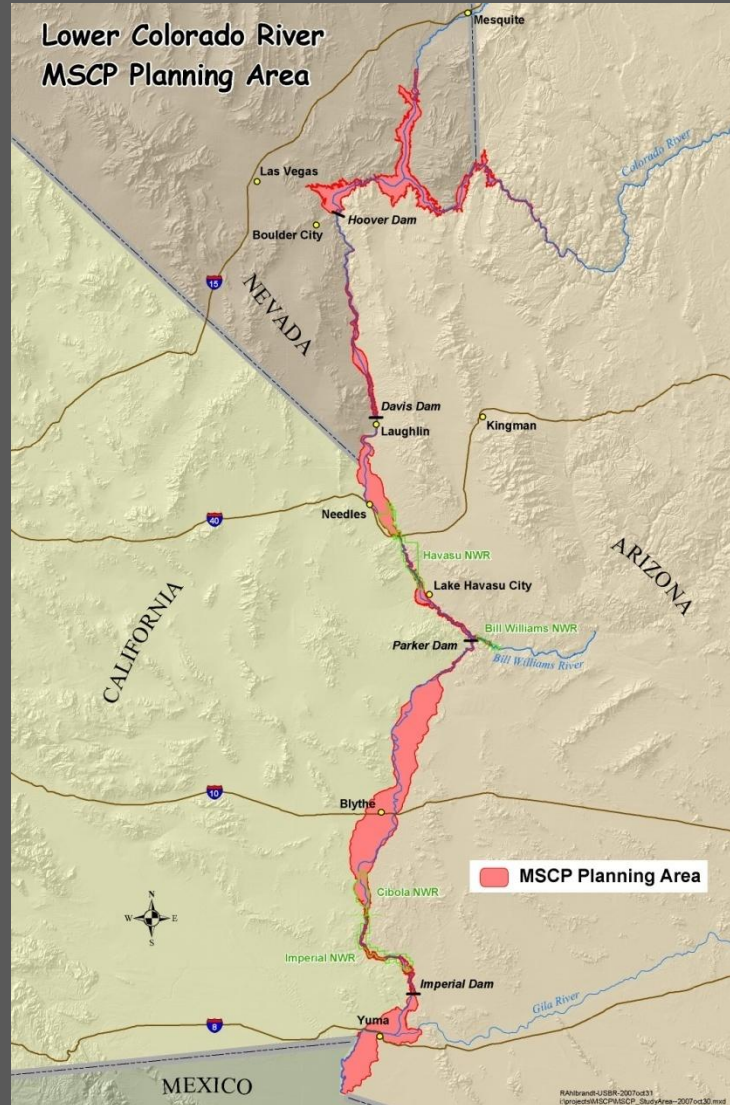
Site and Plot	Area Search Type Implemented					
	2008		2009		2010	
	intensive	rapid	intensive	rapid	intensive	rapid
<i>Beal Lake Riparian Habitat Creation Project</i>						
Beal A	X		X		X	
Beal B	X		X		X	
Beal C	X		X		X	
Beal D	X		X		X	
<i>Colorado River Indian Tribe</i>						
CRIT 9A	X		X			
CRIT 9B	*		X			
CRIT 9C	X		X			
CRIT 9D	X		X			
CRIT 9E	*		X			
<i>Cibola Valley Conservation and Wildlife Area</i>						
CVCA 1A	X				X	
CVCA 1B	X				X	
CVCA 1C and D	X				X	
CVCA 2 (A,B,C)		X			X	
CVCA 3 A & B	X		X		X	
CVCA 3 C & D	X		X		X	
CVCA 4						X
CVCA 5		X				
CVCA 6		X				
Crane Roost		X				
<i>Cibola Nature Trail</i>						
NT-north	X		X		X	
NT-south	X		X		X	
Mass Planting	X		X		X	
<i>Palo Verde Ecological Preserve</i>						
PVER 2A	X		X		X	
PVER 2B	X		X		X	
PVER 3		X			X	
PVER 4		X				X
PVER 7		X				
PVER 8		X				
PVER 9		X				

Habitat Creation Sites



Study Area:

MSCP Planning Area: Colorado River from Separation Point to the Southerly International Boundary with Mexico



Study Area: System-wide

Federal, state, tribal, and private lands



Where to survey: Sampling Design

A detailed description of the sampling plan can be found in Bart 2010.

The goals of the plan were to:

- 1) Provide a baseline for monitoring long-term population trends of obligate riparian birds throughout the lower Colorado River (including habitat creation sites)
- 2) Estimate population sizes of obligate riparian birds
- 3) Define habitat requirements of LCR MSCP covered species.

The Basics:

- Area searches need plots
- Plots layer created in 2007, changed in 2010
- All plots assigned to a habitat type
- original habitat stratification based on combined vegetation classes from the Anderson-Ohmart vegetation classification system
- Stratified random selection of plots each year from the entire plots layer
- Selection weighted for “good” habitat
- ~9000 plots within the MSCP boundary



Habitat Assessment

We collected biotic and abiotic data at randomly selected *use* and *non-use* sites for 5 covered species including:

- Photograph of the site
- Qualitative data on landscape and habitat features
- Cover and foliage height diversity via point-intercept using a 5m veg. pole
- Tree / snag densities and sizes
- Shrub density
- Canopy closure
- Soil moisture



Habitat Assessment

- Different covered species with different habitat needs
- Guidelines for target habitat structure and floristics measurements in habitat creation efforts
- Which habitat variables are statistically good predictors of a breeding territory
- Used univariate logistic regressions for continuous habitat variables as a predictor for presence when comparing use and non-use sites
- Used Fisher's exact tests were used to compare the categorical variables for use and non-use sites



Results: 2010 and 3-year



- 186 species of birds were detected in all 2010 surveys
- ~1/2 of these were migrants and winter residents
- 173 species were recorded in system-wide surveys
- 115 species in habitat creation site surveys.
- 213 species total recorded between 2008 -2010

Results



- All covered species including the Gilded Flicker were detected in at least one site in 2010
- All but the Gilded Flicker and Gila Woodpecker were found nesting in at least one habitat creation site
- Most widespread and common covered species were Bell's Vireo and Yellow Warbler
- Vermilion Flycatcher and Summer Tanager occurred sporadically and in low numbers throughout the project area

Results: System-wide population size estimates

- Detection ratios for 2007-2009 and 2010
- All rapid bird survey techniques may result in biased estimates of birds that are less detectable than others.
- Also, birds that are temporarily undetectable may be missed entirely.
- To obtain an estimate of effect size of this bias, intensive and rapid area searches can be used in a double-sampling approach.
- For this, a surveyor other than the one conducting intensive area searches visits the intensive area search plot to conduct a standard rapid area search without any prior knowledge of the plot and its birds.
- Using the detections during the rapid area search + the actual number of territories present on the plot (determined in the intensive area search) the detection ratio can be estimated
- Use program DS to calculate a detection ratio and population size estimates



Results: System-wide population size estimates

10 most abundant breeders system-wide:

Abert's Towhee

Ash-throated Flycatcher

Black-tailed Gnatcatcher

Blue Grosbeak

Common Yellowthroat

Crissal Thrasher

Lucy's Warbler

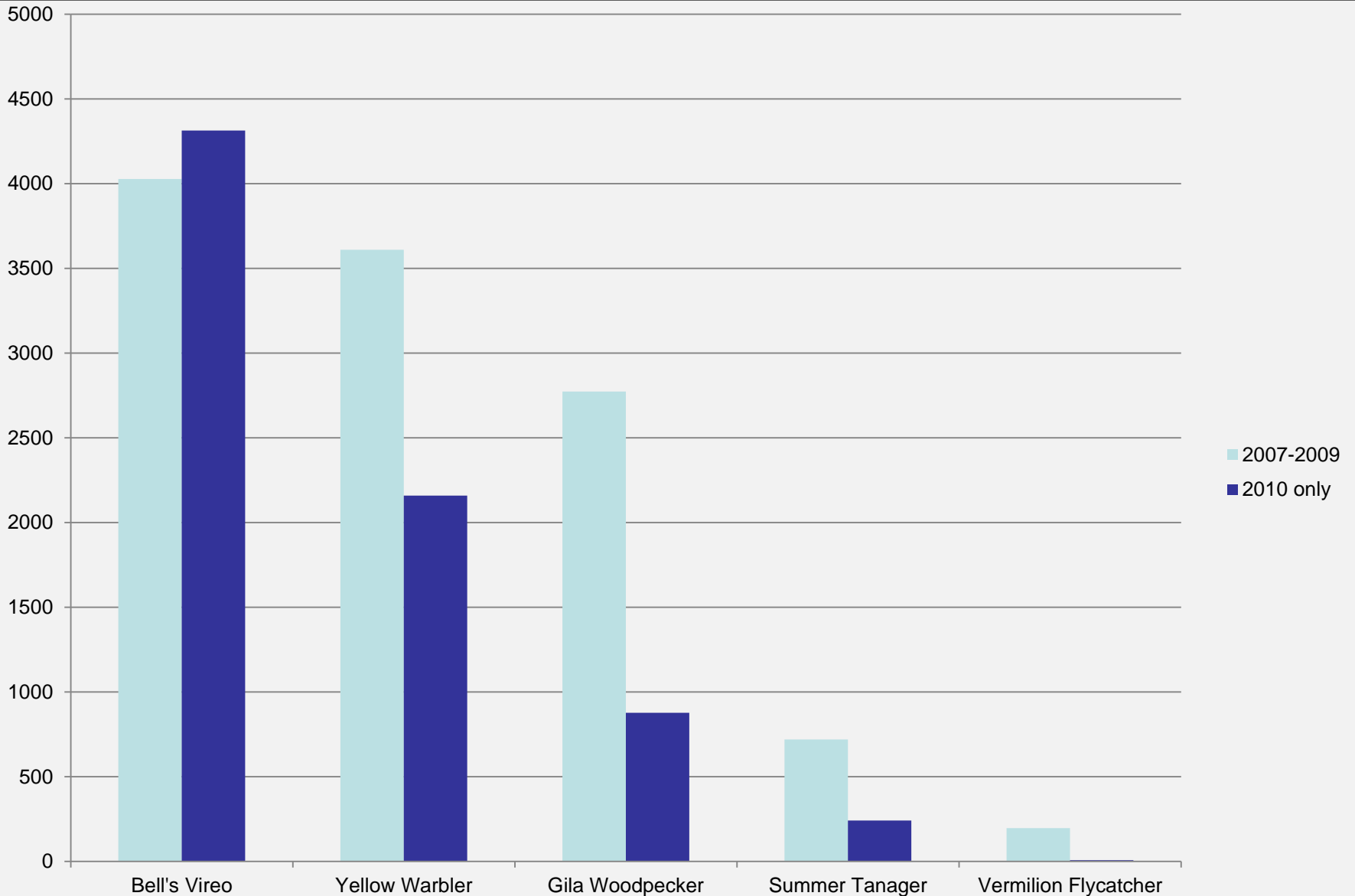
Song Sparrow

Verdin

Yellow-breasted Chat

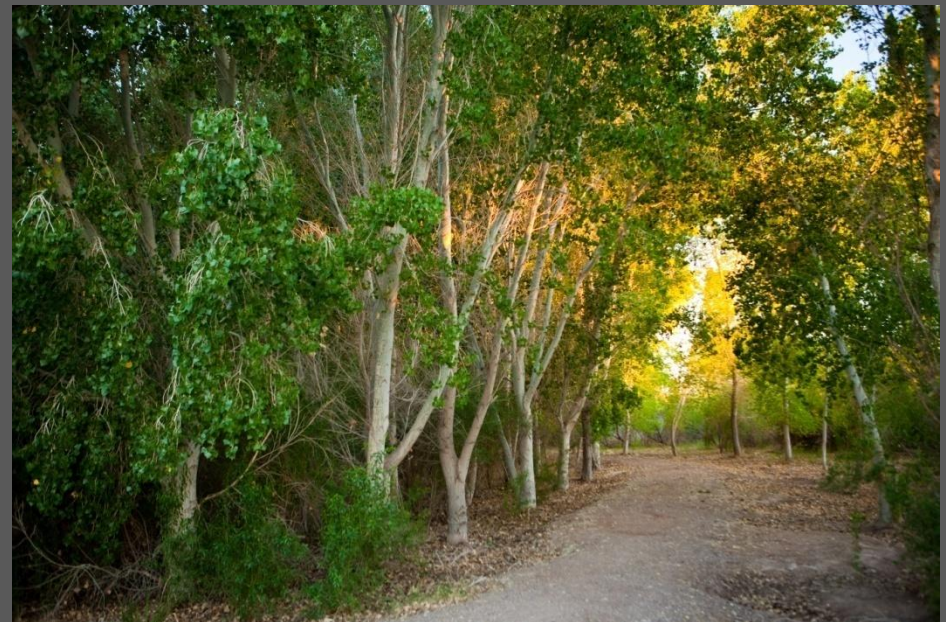


Results: System-wide population size estimates



Results: Habitat Creation Sites

- Four of six covered species (Bell's Vireo, Yellow Warbler, Summer Tanager, and Vermilion Flycatcher) were found breeding in the habitat creation sites
- Gila Woodpecker and Gilded Flickers were not detected on habitat creation sites
- Some cavity nesting birds have partial territories in habitat creation sites



Species	2008	2009	2010	Total
Abert's Towhee	21	36.25	49	106.25
American Kestrel			0.75	0.75
Anna's Hummingbird	1	9	11.75	21.75
Ash-throated Flycatcher		1.75	2.25	4
Barn Owl			0.75	0.75
Bell's Vireo*	4	10	21.5	35.5
Black-chinned Hummingbird	1	2	3.5	6.5
Black-tailed Gnatcatcher	2	3	13.25	18.25
Blue Grosbeak	37	31.75	24.75	93.5
Bullock's Oriole	10	11.25	9.25	30.5
Common Ground-Dove		0.5		0.5
Common Yellowthroat	15	21.75	12	48.75
Crissal Thrasher	1	1	3.25	5.25
Greater Roadrunner	1	1	1.5	3.5
House Finch	6	2	3	11
Indigo Bunting		6.75	3.75	10.5
Ladder-backed Woodpecker		0.5	2.25	2.75
Lesser Goldfinch			1	1
Lucy's Warbler	2	2	7.75	11.75
Mallard	1			1
Northern Harrier	1	1	1	3
Say's Phoebe			0.25	0.25
Song Sparrow	27	15.75	8.75	51.5
Summer Tanager*		1	1	2
Verdin	7	21.25	12.75	41
Western Kingbird	7	9.5	9.25	25.75
Yellow Warbler*	9	12.5	23	44.5
Yellow-breasted Chat	7	21	17	45

Results: Habitat Creation Sites



Results: Beal Breeding Territories 2008-2010

Species	Year		
	2008	2009	2010
Abert's Towhee	8	13.75	25
Anna's Hummingbird			4
Bell's Vireo*	3	10	19.5
Black-chinned Hummingbird	1		1
Black-tailed Gnatcatcher	2	3	12.5
Blue Grosbeak	9	4.75	4.75
Bullock's Oriole	1	1	3
Common Yellowthroat		5.25	1.5
Crissal Thrasher	1	1	2.75
Eurasian Collared-Dove			1
Gambel's Quail	3	2	2
Greater Roadrunner	1		1
Great-tailed Grackle			3
House Finch			2
Indigo Bunting		4.5	
Lucy's Warbler	2	2	7.5
Mourning Dove	3	5	4.5
Song Sparrow	6	5.75	1
Summer Tanager*		1	1
Verdin	6	10.5	10.75
Western Kingbird	1		
White-winged Dove	1		3
Yellow Warbler*	2	7	11.5
Yellow-breasted Chat	5	14	15.5



Results: CVCA Breeding Territories 2008-2010

Species	Year		
	2008	2009	2010
Abert's Towhee	9	12.25	14.25
Anna's Hummingbird		1.25	2.75
Black-chinned Hummingbird			0.5
Blue Grosbeak	17	14	10.25
Bullock's Oriole	3	5.25	2
Common Yellowthroat	2		
European Starling			1.5
Gambel's Quail	1	3	1.75
Greater Roadrunner			0.5
House Finch	4	1	
Indigo Bunting		2.25	3.75
Ladder-backed Woodpecker		0.5	1.25
Lesser Goldfinch			1
Mourning Dove	3	47	36
Song Sparrow	14	6	3
Verdin		1	
Western Kingbird	1	0.5	0.75
White-winged Dove	2	42	38
Yellow Warbler*	3	3.5	3



Results: Nature Trail Breeding Territories 2008-2010

Species	Year		
	2008	2009	2010
Abert's Towhee	4	9.75	5.75
American Kestrel			0.5
Anna's Hummingbird	1	7.75	3.5
Ash-throated Flycatcher		1.75	1.25
Bell's Vireo*			1
Black-chinned Hummingbird		2	
Black-tailed Gnatcatcher			0.75
Blue Grosbeak	5	7	3.25
Bullock's Oriole	5	5	2.75
Common Ground-Dove		0.5	
Common Yellowthroat	6	8	2.25
Crissal Thrasher			0.5
Greater Roadrunner		1	
House Finch	1	1	1
Ladder-backed Woodpecker			1
Mourning Dove	6	15	9
Phainopepla	1		
Red-winged Blackbird		1	
Say's Phoebe			0.25
Song Sparrow	3	3	
Verdin	1	9.75	2
Western Kingbird	5	9	7.25
White-winged Dove	1	7	5
Yellow Warbler*	4	2	5
Yellow-breasted Chat	2	7	1.5



Results: Palo Verde Ecological Reserve Breeding Territories 2008-2010

Species	Year		
	2008	2009	2010
Abert's Towhee		0.5	4
Anna's Hummingbird			1.5
Barn Owl			0.75
Bell's Vireo*	1		1
Black-chinned Hummingbird			2
Blue Grosbeak	5	4	6.5
Bullock's Oriole			1.5
Common Yellowthroat	4	7.75	8.25
House Finch	1		
Lucy's Warbler			0.25
Mallard	1		
Mourning Dove		1	3
Northern Harrier	1	1	1
Song Sparrow	2	1	4.75
Western Kingbird			0.75
White-winged Dove		6	9
Yellow Warbler*			3.5



Results: Cibola Mass Planting Breeding Territories 2008-2010

Species	<u>Year</u>		
	2008	2009	2010
American Kestrel			0.25
Ash-throated Flycatcher			1
Blue Grosbeak	1	2	
Bullock's Oriole	1		
Common Yellowthroat	3	0.75	
Mourning Dove	2	8	5
Song Sparrow	2		
Western Kingbird			0.5
White-winged Dove			5



Results: Habitat Models

- Data collection began in spring 2008 and completed in June 2010
- Did not collect data on Gilded Flicker because they are so rare in the study area
- We assessed:
 - Bell's Vireo - 43 territories
 - Yellow Warbler - 48 territories
 - Gila Woodpecker-38 territories
 - 19 Summer Tanager
 - 14 Vermilion Flycatcher



Results: Habitat Models

Example: Yellow Warbler



Sonoran Yellow Warbler

(*Dendroica petechia sonorana*)

- Habitat: Cottonwood-willow, dense riparian forest
- Sudden drastic decline in 1950's, likely due to loss of habitat, increased parasitism by Brown-headed Cowbirds, and lack of habitat replacement
- Huge population increase sometime in the last 20 years



Grinnell (1914)	Birds of the LCRV (1974-1984)	Current Research (2009)
very common in cottonwood-willow, huge breeding population in the LCRV	numerous during migration, totally absent during breeding, handful of breeding records in 10 years	fairly common migrant and breeder, found on system-wide and restoration sites, dense riparian near water

Categorical Habitat Variable	Use Sites			Non-use sites			Logistic Regression	
	# territories	% territories	Sample Size	# territories	% territories	Sample Size	p-value	Sign of coef.
Landscape Features								
Charcoaled stems w/in 100 m	8	18	45	4	9	46	.23	+
Cliffs 30 ft or taller w/in 100 m	12	26	47	18	39	46	.19	-
Water source in territory	19	41	46	17	37	46	.83	+
Water source w/in 100 m	27	61	44	28	61	46	1	
Water source w/in 1000 m	44	100	44	44	96	46	.50	+
Dry wash > 5 ft wide in territory	3	7	46	11	24	46	.04	-
Dry wash > 5 ft wide w/in 100 m	14	30	47	18	39	46	.39	-
Dry wash > 5 ft wide w/in 1000 m	30	65	46	32	70	46	.82	-
Upland habitat in territory	2	4	47	15	33	45	.001	-
Upland habitat w/in 100 m	7	15	47	18	40	45	.01	-
Upland habitat w/in 1000 m	19	41	46	26	58	45	.14	-
Large Trees and Snags								
Trees >12 cm DBH in territory	38	83	46	27	59	46	.02	+
Trees >12 cm DBH w/in 100 m	40	91	44	32	70	46	.02	+
Trees >12 cm DBH w/in 1000 m	42	98	43	40	87	46	.11	+
Snags >12 cm DBH in territory	18	38	47	3	7	46	.000	+
Snags >12 cm DBH w/in 100m	24	52	46	3	7	46	.000	+
Snags >12 cm DBH w/in 1000 m	36	78	46	25	54	46	.03	+
Branches >12 cm in territory	30	64	47	16	36	45	.012	+
Branches >12 cm w/in 100 m	33	73	45	25	56	45	.12	+
Branches >12 cm w/in 1000 m	40	89	45	35	78	44	.26	+
Tree and Shrub Species (within 30m diameter circle)								
Populus fremontii present	27	59	46	8	21	39	.000	+
spp. present	11	24	46	19	49	39	.02	-
spp. 4 m tall or taller present	11	24	45	12	27	43	.81	-
Saltcedar spp.present	26	57	46	18	46	39	.34	+
spp. present	30	65	46	9	23	39	.000	+
Food Sources								
Anthills in territory	35	75	47	26	57	46	.08	+
Anthills w/in 100 m	43	94	45	38	83	46	.20	+
Anthills w/in 1000 m	45	100	45	46	100	46	1	
Mistletoe in territory	1	2	47	4	9	45	.20	-
Mistletoe w/in 100 m	7	15	47	7	16	45	1	-
Mistletoe w/in 1000 m	15	33	46	20	44	45	.29	-

Results: Yellow Warbler

Significant Continuous variables :

Negative:

Dry wash > 5 ft wide in territory

Upland habitat in territory

Upland habitat w/in 100 m

Mesquite spp. present

Positive:

Trees >12 cm DBH in territory

Trees >12 cm DBH w/in 100 m

Snags >12 cm DBH in territory

Snags >12 cm DBH w/in 100m

Snags >12 cm DBH w/in 1000 m

Branches >12 cm in territory

Populus fremontii present

Willow spp. present

Continuous Habitat Variable	Use Sites				Non-use sites				Logistic Regression	
	Average	Minimum	Maximum	Sample Size	Average	Minimum	Maximum	Sample Size	p-value	Sign of coef.
Total Trees and Tree Species										
# Trees total (all size classes)	84	0	804	46	80.6	0	708	39	.92	+
# <i>Populus fremontii</i> (all sizes)	12.3	0	169	46	16.8	0	199	39	.61	-
# <i>Salix gooddingii</i> (all sizes)	52.5	0	635	46	15.1	0	293	39	.19	+
# <i>Prosopis glandulosa</i> (all sizes)	1.5	0	15	46	3.2	0	30	39	.14	-
# <i>Prosopis pubescens</i> (all sizes)	0.0	0	0	46	0.3	0	6	39	.1	-
# <i>Tamarix ramosissima</i> (all sizes)	11.7	0	120	46	25.1	0	700	39	.49	-
Large Trees										
# High canopy trees (> 10 m tall)	12.5	0	108	46	0.4	0	5	39	.005	+
# Trees >20 cm DBH	26.4	0	264	46	31.8	0	606	39	.75	-
# Large riparian trees (> 20 cm DBH and > 4 m tall)	16.3	0	53	46	5.1	0	105	39	.004	+
# Large <i>Populus fremontii</i> (> 20 cm DBH and > 4 m tall)	6.2	0	45	46	3.1	0	104	39	.29	+
# Large <i>Salix gooddingii</i> (> 20 cm DBH and > 4 m tall)	7.7	0	32	46	0.3	0	4	39	.004	+
# Large <i>Tamarix ramosissima</i> (> 20 cm DBH and > 4 m tall)	2.3	0	39	46	0.4	0	5	39	.036	+
Mid Canopy and Understory Trees										
# Mid canopy trees (4 - < 10 m)	30.2	0	367	46	12.7	0	157	39	.23	+
# Understory trees (1.4 - < 4 m)	41	0	804	46	64.9	0	708	39	.41	-
# Understory <i>Populus fremontii</i>	4.2	0	169	46	7.0	0	92	39	.60	-
# Understory <i>Salix gooddingii</i>	22.8	0	635	46	14.2	0	293	39	.61	+
# Understory <i>Prosopis glandulosa</i>	0.8	0	12	46	2.3	0	22	39	.08	-
# Understory <i>Prosopis pubescens</i>	0.0	0	0	46	0.3	0	6	39	.1	-
# Understory <i>Tamarix ramosissima</i>	8.5	0	120	46	23.2	0	700	39	.46	-
Densimeter Average	12.3	0.9	72	46	4.3	0	16	38	.000	+
Proportion standing water (w/in 50 m)	11.4	0	90	40	5.4	0	90	35	.14	+

Results:
Yellow Warbler, cont.

Significant Continuous variables

Positive:

High canopy trees (> 10 m tall)

Large riparian trees (> 20 cm DBH and > 4 m tall)

Large *Salix gooddingii* (> 20 cm DBH and > 4 m tall)

Large *Tamarix ramosissima* (> 20 cm DBH and > 4 m tall)

Densimeter Average- closed canopy

Future of the Project

- Going to 5-year contract for 2011-2016
- Continue double-sampling system-wide surveys
- Begin double-sampling on habitat creation sites
- Pre-development double-sampling of the Laguna Division Conservation Area (2011)
- Test the effectiveness of the intensive surveys
- Implement new habitat data collection and modeling for the covered species



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- GBBO Staff and Field Technicians

